

CITE

Comprehensive Initiative
on Technology Evaluation



Massachusetts
Institute of
Technology

Year 1, Quarter 1 (Y1Q1) Report Higher Education Solutions Network

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January 31st, 2013



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Executive Summary

This Quarterly Report details CITE's Year One, Quarter One (Y1Q1) objectives, activities and results. Y1Q1 objectives focused primarily on creating the environment within which CITE's faculty, staff and students can achieve the program goals, while at the same time taking the first steps towards developing CITE's evaluation methodology. During Y1Q1, CITE has laid the groundwork for a fruitful year in which faculty, staff and students begin to shape and test CITE product evaluation methods. We have started by engaging with USAID in developing our Workplan and Monitoring and Evaluation Plan; designing a course through which CITE faculty, staff and students can deeply engage with our development organization partners; and by recruiting a Financial/Program Administrator to assist in managing and forecasting CITE resources and coordinating finances across internal CITE partners. More specifically, Y1Q1 activities included:

1. MIT-USAID Cooperative Agreement Finalization
2. Preparation and Attendance at the United States Agency for International Development (USAID) Higher Education Solutions Network (HESN) Launch Event
3. Workplan and Monitoring and Evaluation (M&E) Plan Development
4. Staff and Student Recruitment
5. Initiation of CITE Hub Identification Process
6. CITE Seminar Development
7. CITE Methodology Retreat
8. Product Evaluation Methodology Development

The results of these activities are intermediate in that they place CITE in prime position to deliver substantive results during the next two quarters as the organization recruits students and develops and tests its evaluation methods.

In the coming quarter (Y1Q2), CITE plans to build upon these activities by refining and resubmitting a first year budget that better aligns with first year activities, building an online presence, developing formal working agreements with our development organization partners, building a database of products for the development world and holding the CITE Seminar: *ESD.S20/11.S941: Evaluating Technologies for the Developing World*. Beyond these foundational activities, CITE will work with the International Development Innovation Network (IDIN) to leverage the USAID cooperative agreements into a larger, campus-wide initiative for international development research at MIT in partnership with USAID, MIT Senior Administration, MIT Resource Development.

Program Summary

As a new sponsored research entity at The Massachusetts Institute of Technology (MIT), the Comprehensive Initiative on Technology Evaluation (CITE) has been presented with the great opportunity to shape a vibrant, sustainable organization in deep partnership with United States Agency for International Development (USAID) and its Higher Education Solutions Network (HESN). The Department of Urban Studies and Planning (DUSP), D-Lab, the Sociotechnical Systems Research Center (SSRC), the MIT Center for Transportation and Logistics (CTL) and the Public Service Center (PSC) are the main partners within CITE, a network of MIT faculty, staff, and students with expertise in technology design and testing, systems

engineering, supply chains, community ethnography, institutional and public policy analysis, market systems analysis, and regional economics. CITE's goal is to develop a rigorous product evaluation methodology that will help development organizations make educated decisions in using products that are suitable, scalable and sustainable. Our evaluations will also allow the development community to realize better overall product designs through identifying design principles that effectively address the difficult challenges products designed for developing areas face. By applying our evaluation methodology, CITE will ultimately help to determine and address the bottlenecks that prevent products from achieving significant impact.

CITE will work in partnership with prominent international development organizations including bilateral agencies, foundations, inter-governmental organizations, national science agencies, professional organizations, private sector firms and NGOs that implement, promote or deploy products to alleviate poverty. CITE currently has the support of many such organizations, including USAID, Mercy Corps, International Rescue Committee, Oxfam America, Partners in Health, the World Food Programme, and UNICEF. These partners will support CITE to develop its methods through in situ evaluations of specific products used in their programs.

CITE's methodological approach is to assess products along three complementary axes:

1. Suitability – Product performance in the laboratory and the field according to technical metrics with respect to both consumer expectations and use patterns.
2. Scalability – The capability to reach consumers and impact society on a large scale, taking into account issues of supply chain configuration, sourcing, manufacturing, distribution and after-market support.
3. Sustainability – The ability to affect positive impact over the product lifecycle, taking into account technical, social, economic, institutional, regulatory and environmental factors.

Together these factors define CITE's 3S Framework, which is designed to account for the high degree of complexity involved in deploying products in developing countries. This approach will ensure highest value-for-money on public and private investments in products for international development and enable the concentration of R&D efforts on well-scoped and constrained design challenges.

Quarterly Objectives

Y1Q1 represented a period of institution building for CITE. During this time, CITE management established the organizational foundation within MIT in which CITE faculty and staff can work together to formulate the tools and methods CITE will use. Accordingly, CITE's Y1Q1 activities can be classified under two objectives:

1. Organizational development, yearly planning and relationship building; and
2. Initiation of evaluation methodology development.

Below is a description of each Y1Q1 activity classified under one of the two objectives with an emphasis on the results that build toward CITE's overall goals.

Objective 1: Organizational Development, Yearly Planning and Relationship Building

Cooperative Agreement Finalization

During the USAID-MIT Cooperative Agreement finalization, CITE and IDIN personnel worked closely with the MIT Office of Sponsored Programs (MIT OSP) and with the cognizant USAID Contracting Officer. As a result of the process, CITE personnel have begun to become familiar with the USAID and United States Government regulations and requirements pertinent to the cooperative agreement and are in the process of developing reporting protocols to ensure they are followed. As this process remains ongoing, MIT will, when required, continue to consult with USAID to determine the most appropriate action.

Preparation and Attendance at the USAID HESN Launch Event

The Launch Event was an important milestone in CITE's development as well as the development of the HESN as a whole. As a result of the Launch, CITE was able to re-envision its First Year Workplan to better align with the overall goals of the program and to ask critical questions about the nature of the product evaluation tools and methods that would be useful to USAID. CITE was also able to envision interesting collaborations with other HESN members that may not have come to bear without such a venue for all HESN members to exchange ideas. Finally, the launch provided an effective mechanism for CITE and IDIN to engage MIT's Senior Administration through high-level talks with the USAID Administrator, the Secretary of State, and the Assistant to the President for Science and Technology.

To prepare for the Launch, CITE and IDIN teams collaborated closely to develop informational materials. The major product from this process was a five minute short video outlining the activities which IDIN and CITE propose to undertake. Developed in collaboration with MIT Academic Media Production Services (AMPS), the video was used to introduce Amy Smith and Bish Sanyal's presentations at the launch event and can be found on the IDIN/CITE website and on MIT TechTV¹. The video has turned out to be an important promotional tool for the USAID initiatives on campus and continues to generate interest in both CITE and IDIN. In addition to the video, the CITE and IDIN teams also prepared a short presentation and posters for the HESN poster session held at the National Academy of Sciences.

CITE's delegation to the Higher Education Solutions Network launch event included CITE Director Bish Sanyal, Program Manager Derek Brine, Project Managers Jennifer Green and Jarrod Goentzel, Professor Amos Winter and students Amit Gandhi, David Taylor, Stephen Maouyo and Hisham Bedri. MIT Senior Administration delegates included Dean of Undergraduate Education Daniel Hastings, Provost Chris Kaiser, and Director of the MIT Washington Office, Bill Bonvillian.

Workplan and Monitoring and Evaluation Plan Development

Significant effort during Y1Q1 was put into generating our First Year Workplan and Monitoring and Evaluation plan. The Workplan provides detailed picture of the work CITE will undertake in year one, while the M&E Plan details the metrics CITE will use to gauge its progress toward achieving its goals over five years. Initially both plans were drafted by CITE management and delivered to USAID for review on December 3rd, 2012. On December 17th-18th CITE and IDIN hosted USAID at MIT for discussions on the CITE and IDIN Workplans and Monitoring and Evaluation Plans. The visit allowed the CITE team to revise

¹ <https://techtv.mit.edu/genres/23-global-awareness-action/videos/21590-coming-together-to-redefine-international-development-idin-and-cite>

the Workplan and M&E Plan to better align with the goals and objective of the HESN. The draft First Year Workplan and Monitoring and Evaluation Plan were delivered to USAID on January 3rd, 2013 for review.

USAID Visit to MIT

On December 17th and 18th, CITE and IDIN hosted USAID for substantive discussions at MIT. This meeting allowed both the CITE and IDIN teams to discuss their respective Workplans and Monitoring and Evaluation Plans in detail with USAID representatives. Further, the meeting gave the MIT teams the opportunity to ask questions about the goals of the HESN and to learn more about how to engage with USAID given its internal structure and operation. Lastly, the MIT and USAID teams held a strategy session to explore ways in which the USAID cooperative agreements can be leveraged to create a more focused international development research agenda at MIT. It was concluded that the teams would aim to hold high level talks (USAID and MIT senior administration level) at MIT in April of 2013, during the Rethink Relief conference. In the intervening time the teams will coordinate to prepare their respective administration representatives and develop an agenda for the talks.

USAID attendees included Agreement Officer's Representative, Jessica Rosen; Activity Manager, Dr. Ticora Jones; and Office of Science and Technology COO, Michele Schimpp.

Staff and Student Recruitment

Responsible financial stewardship is a top priority for the CITE management team. As such, CITE management developed a job description for a Financial and Program Administrator to assist primarily with financial reporting and coordination across all departments within CITE. The Financial and Program Administrator will be responsible for financial tracking and reporting, and for assisting in budget development². Working with MIT Human Resources, CITE solicited applications and is in the process of conducting interviews. The successful applicant will start between February 1st and February 15th, 2013.

Recruiting high-quality students also remains a priority. CITE faculty and staff approached several high-potential graduate students to promote participation in the program through semester long research assistantships and through the CITE spring seminar course. In addition, CITE faculty are currently reviewing graduate applicants to their respective departments and programs with CITE research in mind. CITE management expects to identify the majority of outstanding research assistant candidates as a result of the CITE spring seminar.

Initiation of Hub Identification Process

CITE management has begun to explore possible CITE Hub regions, countries and institutions in several areas. One possible option for CITE Hub collaboration is the Singapore University of Technology and Design, SUTD, which committed \$250,000 in cost sharing to the CITE program. From January 12th to January 23rd, 2013, the CITE Program Manager will make an initial trip to Singapore to attend the SUTD International Design Center Summit in order to learn more about possible linkages between CITE and SUTD. Researchers at SUTD have expressed an interest in collaborating with MIT on the USAID initiatives, especially CITE. As such, SUTD may make a logical CITE Hub location given the extensive linkages between MIT and SUTD as well as the committed cost-sharing resources and the proximity and relationships SUTD faculty and staff have with organizations across southeast Asia. A trip report will follow upon the Program Manager's return.

² Please see Appendix A, *Job Description: Financial and Program Administrator*.

Ultimately, when selecting the final locations for CITE Hubs, CITE management will develop a rating system to systematically rank order possible locations based on a number of criteria including the following: each location's fit with the ultimate functions and goals of a CITE Hub; the extent of existing relationship with MIT and other development partners; the amount of resources required and secured; proximity (both physical, cultural and otherwise) to the developing world; and existing level of pertinent expertise at the potential hub location.

Objective 2: Initiation of Evaluation Methodology Development

CITE Seminar Development

The bulk of CITE's substantive work is to commence in Y1Q2 with the CITE Weekly Seminar: ESD.S20/11.S941: Evaluating Technologies for the Developing World³, held on Mondays from 3:30pm to 5:00pm at MIT. CITE anticipates a student population of 25-30 students. The course will consist of a series of lectures, discussions and presentations by MIT faculty and staff, CITE's partners and the students themselves, each designed to build upon the CITE evaluation method or to provide practical context and background for MIT researchers.

Students in the course will work with MIT faculty and staff to generate an initial 3S evaluation methodology and gather, organize and present a database of products designed for the developing world. Additionally, each student in the course will be responsible for developing an in-depth evaluation proposal for a product or technology identified in collaboration with one of CITE's partners. The students will work with those partners to map their product evaluation needs and appropriately scope an evaluation project for summer 2013. The most promising and well defined evaluation proposals will be funded for field research starting June 2013, and the most promising students will be extended research assistantships for the fall of 2013.

Methodology Retreat

From 9:00am to 1:00pm On December 20th, 2012 CITE leadership held the first CITE methodology retreat which brought together all faculty and staff on the CITE program. During the retreat CITE faculty and staff had an opportunity to interact directly with representatives of some of CITE's partners. As a result CITE gained a deeper understanding out partner's needs⁴.

Methodology Development

Suitability

Dan Frey, Faculty lead for Suitability and Derek Brine, Project Manager for Suitability collaborated to write a white paper entitled *Experimental Design Methodology for Product Development and Evaluation* as a starting point for possible suitability evaluation methodologies. In it, they discuss the possible foundations of an evaluation methodology stemming from techniques used in various fields including Design of Experiments, philosophy, medical devices and market research. The authors will contribute this paper to the proceedings of the SUTD International Design Center's Annual Design Summit and will continue to develop the work into an article for an appropriate journal. Upon completion a copy of the paper is forthcoming.

³ Please see Appendix B, *Draft Syllabus for S20/11.S941: Evaluating Technologies for the Developing World*. Final syllabus to be forwarded upon completion.

⁴ Please see Appendix C, *CITE Methodology Retreat Meeting Notes* for a detailed picture of the lessons learned from the retreat.

Scalability

Research on scalability spanned a combination of group brainstorming, individual collaboration and related project work. Steve Graves, Faculty Lead for Scalability, and Jarrod Goentzel, Project Manager for Scalability, began collaboration on a paper providing a framework for supply chain mapping and analysis to assess scalability. The group brainstorming at the CITE methodology retreat yielded several pages of notes to enhance the framework and provide some specific examples based on the case study discussion. Two related projects developing a value chain analysis approach continued to move forward. First, collaboration with World Food Programme evaluating market supply of key commodities (e.g., cereals, pulses, salt, sugar) for the voucher program in Darfur continued with a second site visit to Sudan. Second, collaboration with GlaxoSmithKline continued with a field visit to Zambia and Zimbabwe to assess supply channels to improve availability and lower price to consumers for two representative products.

Sustainability

Work on the methodology for Sustainability assessments during the first quarter focused on the development of a comprehensive framework for evaluating different aspects of sustainability along the traditional axes of the “economic, environmental, and social” parameters as well as the “technological” aspects of the product itself. Jennifer Green, Project Manager for Sustainability, has been reviewing previous work on Sustainability rating systems (e.g., ZOFNASS, LEED, etc) to determine the applicability of “scorecard” type assessment systems, developing taxonomies of context and technology sectors, creating presentation materials for the CITE Seminar, and planning Year 1 activities. The team is also looking into leveraging previous work in System Dynamics, Agent Based Modeling and Object Process Methodology to develop a Sustainability modeling approach that would have applicability to both CITE and the LAUNCH project (with Sydney Do, PhD Candidate) and developing some near term tools for querying economic, environmental and social indicators from online databases.

Looking Ahead

During Y1Q2 CITE will continue to work on the objectives outlined in Y1Q1, undertaking the activities outlined by our workplan. These include, among others, resubmitting the CITE budget to align with the yearly workplan, hiring the Financial and Program Administrator, beginning collaboration with HESN partners and beginning the development of the CITE website. In addition, we will make progress on developing and testing our methodology through the spring Seminar *ESD.S20/11.S941: Evaluating Technologies for the Developing World*. Through presentations, interviews and surveys, this course will engage CITE’s faculty, staff and students with USAID and CITE’s other partners to generate an evaluation methodology and at least 2-3 initial pilot product evaluations to be run in summer and fall of 2013. We expect that from this course we will also generate content for an online technology database with at least 10 technologies from across each of the five sectors outlined in our proposal (water, sanitation, agriculture, energy and health). Finally a number of qualified students will be identified through the course, to whom research assistantship will be extended for summer and fall 2013.

Building upon the Y1Q1 objectives and results, we will engage in activities to raise the profile of the USAID activities on campus through articles in MIT Technology Review and MIT Faculty Newsletter in collaboration with MIT Media Office. More broadly, CITE and IDIN will work to leverage USAID’s investment at MIT to build a larger focus on International Development Research at MIT and beyond through hosting high-level talks between USAID and MIT Senior Administration. To these ends, we anticipate

forming a CITE Board of Advisors that will assist CITE in leveraging resources, making critical connections and assuring intellectual rigor. We hope to have our first board meeting during USAID's first official visit to MIT, during which MIT Senior Administration and USAID Leadership will meet to discuss how to build strong institutional footing for CITE & IDIN at MIT.

Conclusion

During Y1Q1, CITE has continued to build the infrastructure necessary to achieve its goals, both by building relationships with partners and recruiting the staff and students it needs to complete its work. At the same time CITE researchers have taken the first steps toward development of the product evaluation methodologies that CITE will pioneer. Taken together, the activities completed in Y1Q1 represent CITE's critical institution building phase.

Looking ahead, CITE plans to continue to build its evaluation methodologies in the spring seminar course, which will allow for the regular convening of CITE researchers and students. By the end of the course, CITE expects to have identified several promising students and pilot evaluation studies which they can complete in collaboration with USAID and its other development organization partners. At the same time, CITE will begin to develop an online presence, establish formal partnering arrangements with its supporting organizations and develop a board of advisors to generate resources and legitimate its work.

Finally, CITE and IDIN are committed to raising the profile of international development at MIT and beyond. Both initiatives have experienced a great deal of interest from across the MIT campus and leveraging that interest into a larger coordinated effort is a key goal. In Y1Q2, CITE will focus on harnessing that interest and playing a leading role in directing it towards the larger goal of an integrated, well-resourced international development research agenda at MIT.

Appendix A: Job Description: Financial and Program Administrator

Reports to: CITE Program Manager and DUSP Administrative Officer

FINANCIAL AND PROGRAM ADMINISTRATOR, Full Time, Department of Urban Studies and Planning (DUSP), to oversee the financial and administrative functions of the Comprehensive Initiative on Technology Evaluation (CITE), a new research program funded by the United States Agency for International Development (USAID). The main duties will be to manage CITE's financial and technical reporting processes. The Administrator will be knowledgeable about the details of CITE's Cooperative Agreement and both MIT and USAID's policies and procedures to ensure that all agreement requirements are continually satisfied in a timely and professional manner.

This person will be part of a small program team and will have the opportunity to contribute beyond financial and technical reporting. As such, there exists opportunity for the successful applicant to become a contributor to the development of the program as a whole by working on strategic plans and communicating with USAID in close partnership with the Program Manager and Program Director.

Duties:

1. Establishing, implementing and updating financial systems and controls in compliance with MIT and USAID policies, procedures and regulations in collaboration with other participating departments and the Office of Sponsored Programs (OSP).
2. Day-to-day financial tracking including monitoring of the approved direct and indirect agreement expenditures and cost sharing accounts in collaboration with other participating MIT departments.
3. Providing Program Manager, Administrative Officer and Principal Investigator with periodic updates of project finances, and promptly notifying of any fiscal anomalies.
4. Liaising with departmental staff and the Office of Sponsored Programs (OSP) to compile and submit quarterly and annual financial and technical reports in a timely fashion. This includes gathering and compiling all financial and technical documentation from project faculty, staff and students.
5. Where applicable, contributing to program deliverables (such as work plans, monitoring and evaluation plans, quarterly reports etc.) or sections thereof as a primary author.
6. Attending regular CITE meetings and seminars to report the financial state of the program and to provide counsel regarding agreement procedures to Principal Investigators (PIs), program management and departmental support staff.
7. Coordinating and maintaining detailed travel, equipment and other approvals from the sponsoring agency and ensuring that faculty staff and students adhere to program reporting and approval requirements.
8. Working directly with the Program Manager to develop specific aspects of programmatic strategy related to resource stewardship, relationship management, communications and outreach, and, when/if appropriate, technology evaluation.
9. Liaising with the MIT Media Office and directing media requests to the appropriate program staff in collaboration with the D-Lab Communications Officer.

10. Communicating directly with USAID contracting staff and keeping abreast of new opportunities for partnerships through grants, cooperative agreements and contracts with USAID and other funding agencies.
11. Traveling (up to 10%) to Washington DC or other locations domestic and/or international for meetings with USAID and other partners.
12. Providing other administrative and logistical support such as scheduling meetings, supervising administrative project staff as needed and working proactively as part of a small program team, etc.

Required Skills:

1. Bachelor's degree (Master's degree desirable) in Management, International Studies, Engineering, Sciences, or related field.
2. At least 5 years combined financial and program administration including financial reporting experience, with preference in the area of research, or research & development of products in developing countries.
3. High level of confidence and exceptional ability to communicate effectively with colleagues and management both verbally and in writing.
4. A desire to continually improve the systems and functioning of the organization.
5. High degree of competence with Microsoft Office Suite, and preparing and executing meeting presentations using these tools.
6. Desire and ability to contribute to substantive discussions with CITE faculty, staff and students about programmatic issues—both financial and non-financial.
7. Strong ability to network and cultivate partnerships with colleagues at USAID, partner NGOs and beyond.
8. Excellent organizational ability, with astute attention to detail, ability to deal with ambiguity and to set and prioritize objectives and goals.
9. Entrepreneurial drive and ability to make sound decisions in order to take advantage of opportunities as they arise.
10. Ability to anticipate program needs and take action to ensure continuous, smooth functioning of the program.
11. Ability to think outside the box to leverage resources and control costs.
12. Strong interpersonal skills, flexibility, resourcefulness, a cheerful attitude and a good sense of humor are critical.

Desired Skills/Experience:

1. Interest in the history of technology and international development.
2. Experience with USAID and/or MIT financial reporting processes highly desired.
3. Experience living and/or working in a developing country.
4. Experience with Adobe Illustrator or other graphic design suite software.
5. Web design and maintenance skills.
6. Some technical expertise in a field relevant to international development including off-grid power solutions, water and sanitation, rural health or agriculture is a plus.

Appendix B: Draft Syllabus for S20/11.S941: Evaluating Technologies for the Developing World

ESD.S20/11.S941: Evaluating Technologies for the Developing World

Introduction

Animated by a grant from the U.S. Agency for International Development to establish the Comprehensive Initiative on Technology Evaluation (CITE) at MIT, this seminar will serve as a forum for developing new methodologies for assessment of products designed to improve the quality of life of low-income households in developing countries. Sessions will explore methods of evaluation from various disciplinary and applied fields to ensure that these products are technically suitable, scalable and sustainable. In addition, the course will focus on addressing real-world constraints and problems faced by development agencies, governments, NGOs, and entrepreneurs, and look for ways to circumvent such constraints. Led by faculty from Engineering Systems Division and Urban Studies and Planning, and drawing on presentations by MIT's research scientists and practitioners from USAID, Partners in Health, Mercy Corps, Oxfam America, Consumer Reports, this seminar will analyze various evaluation methodologies, incorporating knowledge and techniques from a range of disciplines including Systems Engineering, Institutional Analysis, Experimental Design, Supply Chain Analysis and Community Development. Students will be expected to develop individual research proposals and evaluation plans focusing on a specific product in any of the following five sectors: agriculture, health, energy, sanitation, and water. Students who write the most promising proposals may be asked to formally join the CITE research team by the end of the seminar and continue to work closely with CITE team leaders to conduct fieldwork over summer 2013.

Course Administration

Professors: [Bish Sanyal \(sanyal@mit.edu\)](mailto:sanyal@mit.edu), [Oli de Weck \(deweck@mit.edu\)](mailto:deweck@mit.edu)

TA: Stephen Maouyo

Class site: <http://stellar.mit.edu/S/course/ESD/sp13/ESD.S20/>

Schedule: Mondays, 3:30-5:00, Room 4-149

Prerequisites

Students are expected to have not only an interest in poverty alleviation and international development, but also a familiarity with evaluation of technologies intended for the poor. As such, our preference is to have students with either an undergraduate degree in an engineering discipline, OR have taken ANY of the following courses: Any D-Lab course, 11.005, 11.701, 16.810J, ESD.283, 2.007, 14.003. Students may also request permission of the instructors if they meet none of the aforementioned prerequisites.

Class attendance and participation

This course is an opportunity to participate actively in a new research initiative at MIT funded by USAID. Thus, it is crucial that students attend and participate fully in every session. The speakers' presentations and the discussions that follow are critical for successful development of the CITE research program. It is our hope that students who enroll in the course will have long-term involvement in the CITE initiative.

Readings (To Be Announced)

Readings for each week will be posted to the course site. Students are expected to have read and be prepared to discuss readings for each week before coming to class. New readings, supplied by faculty, partners, as well as students themselves, will be added to the CITE's library throughout the semester.

Homework

Students will also be responsible for assisting CITE to survey the landscape of products and technology designed for the developing world. To do so, students will complete a series of standardized product reports that could easily be turned into content for an online, customizable product database/catalog covering issues from sourcing and production to cultural context to technical specifications and more. Students will be divided into teams, each of which will cover one of five technology areas—agriculture, health, energy, sanitation, and water—and will be expected to perform an in-depth literature review and to consult CITE's organizational partners in order to gather the

information for each product report. Students with experience in database architecture and programming wishing to work on the architecture and programming of the database are encouraged to approach the course staff.

Because of the importance of student initiative and participation in the CITE program, students will also, as a class, be expected to present a plan for fostering student interest and ensuring student participation in CITE as part of the discussion on May 6th.

Project

Students will also work individually on a final project for the class. Over the course of the semester, students will learn about and assist in the development of the 3S product evaluation methodology. Toward this end, the project will require students to pick a particular product or product type, perform a literature review, and propose an evaluation design based on some of the 3-S methods developed in class. In determining the subject matter of their project, students will be paired with CITE's partner organizations (Oxfam, Mercy Corps, UNICEF, World Food Program, Partners in Health, or the International Rescue Committee) and select a product with which one of the partner organizations is currently grappling. Students will be required to submit a written evaluation plan based on the concepts developed in class and present their evaluation design during an extended class session on May 13th. Based on the quality of the proposal, select students will be offered research funding from CITE beginning in the summer of 2013.

Exams

There will be no exams in the course.

Grading

Attendance	10%
Participation	30%
Assignments	20%
Project	40%

Detailed Schedule

Session 1	February 11 th	History of Technological Approaches to Poverty Alleviation and Overview of CITE's 3-S (Suitability, Scalability, Sustainability) Analytical Approach <i>Speaker: Profs. Sanyal, de Weck</i>
Session 2	February 19 th	Reiterating USAID's priorities <i>Speakers: Dr. Alex Dehgan, Science and Technology Adviser to the Administrator, USAID; Dr. Ticora Jones, Senior Advisor, USAID; Michele Schimpp, Chief Operating Officer, USAID</i>
Session 3	February 25 th	Suitability: What is it? How do we measure it? What methodologies do we propose? <i>Speakers: Profs. Frey, Winter; Derek Brine, Program Manager, CITE</i>
Session 4	March 4 th	Scalability: How do we expand the scale of any technological initiative? What methodologies would be appropriate to evaluate scalability? <i>Speakers: Prof. Graves; Dr. Jarrod Goentzel, Director, MIT Humanitarian Response Lab</i>
Session 5	March 11 th	Sustainability: How do you create technologies that are sustainable? What are the barriers to sustainability? How can they be evaluated? <i>Speakers: Prof. de Weck; Jennifer Green, Research Scientist, ESD</i>

Session 6	March 18 th	What will it take to create the equivalent of “Consumer Reports” for poverty-alleviating technologies? <i>Speakers: Jeff Asher, Consumer Reports; Noha El-Ghobashy, Iana Aranda, Engineering for Change</i>
Session 7	April 1 st	Technological Needs Assessment by CITE Partners: Oxfam/Mercy Corps <i>Speakers</i>
Session 8	April 8 th	Technological Needs Assessment by CITE Partners: UNICEF/World Food Program <i>Speakers</i>
Session 9	April 22 nd	Technological Needs Assessment by CITE Partners: Partners in Health/International Rescue Committee <i>Speakers</i>
Session 10	April 29 th	Abdul Latif Jameel Poverty Action Lab’s Evaluation Methodology <i>Speaker: Jasmine Shah, Policy Manager, J-PAL Global</i>
Session 11	May 6 th	Student Proposal Presentations
Session 12	May 13 th	Future Directions of CITE

Appendix C: CITE Methodology Retreat Meeting Notes

First CITE Methodology Retreat

December 20, 2012

Composed by Derek Brine

ACTION ITEMS AT END OF DOCUMENT

Participants:

First Name	Last name	Position	Institution	Email
Derek	Brine	Program Manager, CITE Project Manager, Suitability, CITE	MIT	brine@mit.edu
Xavier	de Souza Briggs	Professor, Urban Studies and Planning	MIT	xbriggs@mit.edu
Oli	de Weck	Professor, Engineering Systems Division	MIT	deweck@mit.edu
Mike	Delaney	Director, Humanitarian Response Department	Oxfam America	MDelaney@oxfamamerica.org
Doug	Fearing	Professor, Harvard Business School	Harvard	dfearing@hbs.edu
Dan	Frey	Professor, Mechanical Engineering	MIT	danfrey@mit.edu
Amy	Glasmeier	Professor, Urban Studies and Planning	MIT	amyglas@mit.edu
Jarrold	Goentzel	Project Manager, Scalability, CITE	MIT	goentzel@mit.edu
Victor	Grau-Serrat	Co-Director, D-Lab	MIT	victoris@mit.edu
Steve	Graves	Professor, Sloan School of Management	MIT	sgraves@mit.edu
Jennifer	Green	Project Manager, Sustainability, CITE	MIT	jlgreen@mit.edu
Shanti	Kleiman	Policy Analyst	Mercy Corps	skleiman@dc.mercycorps.org
Jon	Lascher	Haiti Program Manager	Partners in Health	jlascher@pih.org
Bish	Sanyal	Director, CITE	MIT	sanyal@mit.edu
Sally	Susnowitz	Director, Public Service Center	MIT	susnowit@mit.edu
Amos	Winter	Professor, Mechanical Engineering	MIT	awinter@mit.edu

Practitioner's Panel:

Shanti Kleiman, Mercy Corps:

Often we rely on external expertise and lack the ability to compare (or even find) all the options. It is difficult to choose between them for impact.

Mercy Corps is mostly concerned about whether there will truly be an impact for the beneficiaries.

Some of the factors that we need to take into consideration are customs, tax duties, supply chain, technical feasibility etc. These are called the *enabling environment*. Mercy Corps tries to identify the bottlenecks.

Practitioners need a tool that helps compare solutions and make decisions based on projected impact, while understanding the risk.

Mike Delaney, Oxfam America:

The road to development is littered with good intentions and failed infrastructure. The 3S Framework feels right, but we should remain flexible.

Our beneficiaries often find or develop their own appropriate technology – we can take look to those techniques to build a methodology. Need to allow for entrepreneurship on a local level.

Oxfam sees this as an opportunity to bridge humanitarian response and development. Humanitarian investment is very short – huge investment with no lasting return. CITE can take advantage of this investment by making sure the investment is spent on products that will assist in the development effort.

Technologies that we use are so context specific. Ethiopia alone has so many contexts within itself. A major question is **how will the CITE methodology deal with the varying contexts we find in the places where we work?**

Oxfam needs products that can withstand robust use – by adults and children – and that are simply introduced and demonstrated, including easy training, accessible replacement parts, and cost vs. scale. How long it will hold up is critical.

Jon Lascher, Partners In Health:

Solution evaluation is crucial – but keep in mind the question is: what is an ‘appropriate technology’? ‘Technology’ is defined differently by different people. Ex. Cholera vaccine is defined as technology by PIH. This is critical because it affect policy.

Successful evaluation should help CITE’s partners to win these policy debates based on a thoughtful methodical, analysis. Another key question here is: do we overemphasize risk in international development? And, if so, how do we get over that?

For example when PIH introduced the Cholera vaccine some policymakers thought it would not work, that people would riot. The vaccine takes two courses and they said that the completion rate would be below 40%. Using some ICT/tablet computer technology PIH achieved a completion rate of 91%. How could we have predicted this result ahead of time to ease people’s fears? Can we do it by reducing risk with thorough evaluation? Having a peer review or a panel is important to this as well.

Discussion

Local production and linking people with seed capital and investment is critical. How could CITE achieve this through evaluation? → Perhaps use the CITE Hubs to attract investment

ICT/Mobile is the definition of technology 50% of time as cited by Mercy Corps field teams.

Practitioners need decision making tool – one that helps laypeople make decisions easily since they are maxed out on time. Technology aggregators do exist such as Appropedia, Technology Exchange Laboratory etc, however practitioners do not have time energy or resources to sift through 40 page reports and need customized solutions evaluation of risks and benefits.

CITE needs to make this tool actionable and based on solid contextually specific data.

Field program managers would be the ones to use it. In Ethiopia, she had money to spend on technology but didn’t know where to start or have a system for thing it through. At the same time there were time pressures and Mercy Corps needs to show results in order to get further funding.

PIH has very limited resources for funding for technology outside health. So if a non-health related product is desperately needed to complement the health work ex. Water treatment solutions – A fast decision making tool is needed.

Another question that CITE might be able to take on is: **What are the best practices for rolling out technology?**

Case Study Groups:

Suitability	Scalability	Sustainability
Derek	Jarrold	Jennifer
Dan	Doug	Amy
Amos	Steve	Xav
Victor	Sally	Oli
Shanti	Jon	Mike

*Bish visited all groups.

*****PLEASE SEE APPENDIX 1 FOR SMALL GROUP NOTES*****

Small Group Report Out

Key takeaways from small group sessions:

1. Need to determine how much to focus on research vs. immediate need of practitioners to have decision making tools.
2. Evaluations can address constraints and develop coefficients that result in some kind of scoring. Solutions need to qualify and subsequently score.
3. Financial viability of a solution is important.
4. The suitability team had a challenge staying solely on suitability and instead focused on de-coupling the problem and the solution.
5. Need to be careful to define a program scope that contains research and application without being too broad.
6. Bish was struck by the rigor of each conversation. Connecting them will be the biggest challenge. We should ask ourselves whether the 3S framework is the best way to slice the problem given our goal and resources.
7. There is a balance between local context. Are we going to get deep into the criteria locally or will people provide information?
8. The inputs that we are looking at are coming from somewhere. We have to think about how we are going to sample products so we address the needs of all of our partners given limited resources.
9. In trying to go through the process we kept asking ourselves: is the problem framed the right way?
10. Can we borrow different methodologies from chemical production, philosophy, medical authorization, insurance, etc. in a similar way that J-PAL borrowed from medicine and applied RCT to economics?
11. Who owns the information that we need? Where do the inputs reside?
12. Should we separate out these facts under 3S or not? Practical application for starting to work in the spring – recently there was funding for purchasing 4 incinerators. Could we have developed a method for incinerators?
13. CITE needs to decouple a problem statement from a solution. This will help to define the space for new solutions as well.
14. How do we generalize an evaluation? Through a method. We can define several ‘key context variables’ – specific drivers that can be modeled.

15. Generally there aren't evaluations one two or three years on. This data is often in practitioners' heads. How do we access this for sustainability?

Afternoon Discussion

Topic: Should we tackle a small number of technologies in depth or a larger number of technologies at a higher level?

We cannot say in advance we know what we're going to do. However, practitioners say there is a need for a decision making tool. Some useful characteristics would include:

1. Allowance for space for contributor to get and give information
2. Should be 'fast' and focus on the impact of the solution, product or technology
3. Should target program or project managers
4. Should help

We need more information from our partners to make a plan on how we will go forward that can scope a problem that has a research focus as well as a practical focus.

To do this work, students should be partnered/embedded with our partner organizations – an internship.

They need a framework that they can follow: questions, protocols etc.

We will also need some resources – data technical archivist for this project, web based platform that would support the work of CITE. We can then get feedback on the tools on a quarterly basis from the partners by showing them our methodology and tools, i.e. we can present what that platform would look like or what the process would be for identifying the right product/solution.

Topic: We said that we would create 2 Technology Evaluation Hubs – what form would be useful? Where should they be placed? How should we fund them?

Typically 60-65% of humanitarian/development money goes into 18 countries. All Horn of Africa countries receive some of this money. Addis Ababa does initially seem like a good choice since the African Union is there and it is located in the region receiving the largest amount of humanitarian assistance.

India could be a candidate with USAID's vast network and MIT's Tata initiative.

There is a case to be made for placing a hub into a country that doesn't have the humanitarian infrastructure that others do in order to be a magnet site.

We could tie into the EdX platform and do a HubX – worldwide presence and access.

Once we perform good work we will be able to leverage outside funding for the Hubs. There is a tradition of this here at MIT: SUTD, Saudi Arabia, Abu Dhabi etc.

Topic: How do we make global development a real priority here at MIT?

Create a Global Development Initiative that can be the focus of the Capital Campaign. The Campaign focuses on mission-driven research initiatives that have:

- a. Critical interest from all five schools
- b. Potential for donors
- c. Research interests consistent with MIT's moral values

To do this we need to:

1. Articulate how we will transform some aspect of education.

2. Have an impact in Africa, Latin America or Asia. Many faculty want to, however the resources are generally for developed countries (Singapore, Abu Dhabi, Saudi Arabia, and Portugal etc). With the help of the capital campaign, we could create a real presence in the developing world.
3. Start working with Jeff Newton and resource development to identify potential large donors.
4. Think carefully about the labs and the practitioners and how they will link to the initiative.
5. Form a consortium of partners in the form of letters of commitment. This can play to the “Mens et Manus” motto.
6. Create an advisory board.
7. Show a real plan for a self sustaining organization at the end of 5 years.

To support this effort, each one of the faculty to create a research statement and formulate several research questions they found important.

Action items

Task	Responsibility	Date
Develop course syllabus and send to potential speakers to arrange presentation dates	Bish Sanyal	26-Dec-12
Send information about the larger HESN	Derek Brine	31-Dec-12
Formulate a CITE research statement and three research questions that align with your current research and goals of the project as you understand them after having been at the methodology retreat. Send to Derek Brine.	Each MIT participant	15-Jan-13
Begin the process of setting up an online collaboration space and database architecture for our program	Jennifer Green	15-Jan-13
Develop a partner questionnaire and survey to gather data on the most useful information and tools for practitioners making decisions in the field.	Derek Brine, Jennifer Green, Jarrod Goentzel	31-Jan-13

Potential Strategic Directions

- Engage with Peace Corps to recruit Masters and PhD students
- Consult with JD Power and Associates, Consumer Reports, Which, Underwriter’s Laboratory etc.

Appendix 1: Small Group Notes

Suitability Notes

Taken by Derek Brine

Sanitation Case:

Before jumping to the solution space (i.e. we need a new type of toilet) the most important aspect of suitability is to define the problem, then define the system. In the case of sanitation this includes asking: What is the negative effect we are trying to address? → Is it access to sanitation facilities? Is it access to clean water? Is it re-contamination of clean water? Is it an issue of odor? Is it contamination of groundwater sources?

Once that has been identified, look to the system:

What are the failure points? → Do 20% of the toilets cause 80% of the problem? What infrastructure exists? Who are the stakeholders? What is the cultural climate, i.e. user preferences and practices? Who is willing to pay or contribute and why? What value is offered by different products and technology?

This problem and system definition allows us to define solution specifications that encompass not only technical targets, but also user preference targets, etc.

Ultimately, suitability really has to do not with solutions but with problem definition first then solution evaluation against the constraints of the problem. We can then evaluate a range of options that address:

1. Different technology “levels”, from DIY to developed product
2. Level of skill required
3. Extent of technical nature
4. Willingness to pay vs. willingness to contribute
5. Value proposition

Suitability Methodology Development:

What other fields can we borrow from?

1. RSM from chemical industry
2. Design of Experiments → R.A. Fischer
3. Thought Experiments:
 - a. Can we simply think a problem through and get the same results that J-Pal would get with 1/10 the time and 1/6 the resources? What tools would we need in order to do this? →
 - i. A method for determining the ‘right’ group, how to get all the factors on the table (Métis)
 - ii. HubX convenings/online convening tools and simulations → perhaps talk to Media Lab on this.
 - iii. A possible input would be proxy solutions similar to those that might be implemented in the field. Simulations could be run based on the results of those products: similar to Zephyr texting at MIT.
 - b. We could to link each of the expert-identified factors to a risk level that would give practitioners a ‘contingency map’. We could then explore the concept of decision based on acceptable risk.
 - c. Ethnography from anthropology.
 - d. Progressive authorization from medical devices.

In this way, CITE can evaluate past, present and future solutions/products → blur the line between summative and formative evaluation

For our implementing partners the pressure for results is intense. After development of the design requirements and application of the methodology a practitioner’s tool would show how solutions meet the ‘ideal’ design requirements.

But what makes this process different from traditional design?

1. The comprehensive nature of the design requirements
2. The extreme resource constraints

3. The predictive nature and the distinct focus on societal impact that drives the development of the methodology.

Practically, this process needs to be designed into grants. We should work with our implementing partners ASAP to test out the first iteration.

Where do we get initial options for solutions? Perhaps from ideas that already seem somewhat successful. Perhaps some researchers from CITE can be integrated into the current testing that Mercy Corps or another partner does in order to understand how they currently evaluate solutions.

Scalability Notes

Taken by Jarrod Goentzel

- How does the product provide service profiles/requirements that best fit the labor context?
 - Match with skill sets
 - Compensation potential, livelihoods
 - Labor for maintenance may be more/less attractive than desludging
- Investment up front vs. labor over time – what is the right tradeoff?
- Cultural adoption for servicing process (*Suitability* for servicing?)
- Willingness to pay for desludging, capability to pay
- Hidden assets – prestige for having indoor toilet?
- Use for end product, use of byproducts
- What is the service model? Government service funded by taxes? Larger economic context.
- Local manufacturing capabilities, maintenance capabilities, ability to import parts, etc.
- What is the landed cost?
 - Product cost
 - Upstream costs
 - Manufacturing/assembly costs
 - Local manufacturing option
 - Transportation/import duties
 - Margins for wholesalers, etc.
 - Installation
 - Future servicing
- Process maps for
 - Installation
 - Service (emptying)
 - Maintenance
 - Flood mitigation
- Complexity of the manufacturing process
 - Manual labor, technical processes
 - Capital equipment, tools required
 - Potential for postponement to enable local manufacturing
 - Local resources: raw materials, vendors, service providers for outsourcing (manufacturing, transportation, distribution, installation, maintenance, etc.)
- Market potential, demand
 - Link to willingness to pay
 - Demand over time – one time install or ongoing product demand?

- Regional demand potential beyond program area
 - Should we have the manufacturer present the market research? How to deal with their bias (sales pitch) on the market potential?
 - What is the information flow? How to ask for info from the organizations pitching the product?
- What failure modes/risks exist?
 - What is their risk mitigation plan?
- How do we evaluate the supply base for the product manufacturer?
 - How many tiers upstream?
 - How would we collect the data?
 - Would we simply evaluate their supplier selection approach?
- Input from *Sustainability* regarding environmental costs
- What is the nature of the supplier delivering the product? Centralized-decentralized continuum.
 - a global business/organization
 - a very local manufacturer/service provider
 - grassroots effort in each village to deploy appropriate technology
- Organizational scale up is different than community/grassroots scale up.
- What is our outcome?
 - Binary indicator (use/don't use)
 - Ordinal category
 - Continuous score
- Are characteristics constraints or coefficients?
 - Constraint
 - without satisfying, then the product is not recommended/considered
 - qualify the product
 - Coefficient
 - value used to create outcome score
 - quantify the impact
 - Maybe both
- What is the overall impact in picking winners and losers?
 - Do/should we help consolidate the market to enable scale?
 - Be careful about picking winners/losers. Need transparency.
 - Market consolidation/clustering would naturally lead to better evaluations.
- Uncertainty. Risk/reward.
 - What is our evaluation risk profile?
 - What is our bias?
- Extending to a higher level is easier
 - Removed from specifics, evaluate using ranges and tolerances
 - Listing requirements to scale
- What is the mix of current and future products/solutions that we should consider?
- Noticed several mobile technologies. Information technology also raised by NGOs. IT is different.
 - How do you deploy/update software?
 - How to achieve/maintain critical mass (more than price)
 - Rapid changes in market, technology churn
 - Standardization and data sharing are key

- Training on software is part of the product/solution.
 - Consider implementation costs/time/processes.
- IT raises question: are technologies only for beneficiaries or also consider enabling technologies for program implementation?
- Decision making context for products
 - Which intervention is best? How do NGOs select amongst sectors?
 - Can Value for Money approaches be used in selecting technologies
- Should we help organizations design pilots? If yes, how?
 - Two goals?
 - To help them make a decision
 - To give us more info for improving evaluations
- Potential new info arising from the pilot:
 - constraints/coefficients
 - mitigating factors
 - unanticipated parameters
 - things we were wrong about in our evaluation
- First, we need to properly qualify any evaluation with assumptions used
- Other issues that could change the evaluation validity
 - New products/competitors
 - Incidents
 - Fuel cost, labor cost changes
 - Key component/commodity price shifts
 - Price/usefulness of by products (secondary revenue streams/livelihood improvements)

Sustainability Notes

Taken by Jennifer Green

- Choosing initial latrine design: is there an initial database of designs that we would go to? Can we have interactive database where you set a few key variables and it returns candidate designs? (example TRIZ database <http://www.triz40.com/>) Is there a way to transfer technologies from other contexts?
- Can we widen the design space from what NGO partner suggests (e.g., instead of latrine use composing toilet; is a permanent structure right design?)
- Tool for initial downselect: need easy to use tool to extract candidate technologies across wide range of options; how do we compare technologies across a wide range of contexts (e.g. diesel pumps work well in one context but not others; impacts of climate variation)
- Brief discussion on end product of “Sustainable Technology Decision Support System” similar to CCES/Saudi products
- Methodology for sustainability:
 - Need to look at Return on Investment from two sides: a) ROI for manufacturers; b) ROI for beneficiaries/users. Both a & b need to be positive to be sustainable
 - Difficulty in case of collective action – e.g., if there is a 90% adoption of a sanitation technology but 10% not adopting ruins public health for everyone, then does the adoption rate really matter?

- Role of context: for suitability, we need to identify major factors of performance and then perform sensitivity analysis to show how they might be impacted by context;
- Perhaps we could look at “Design Reference Mission (DRM)” type approach used by NASA and evaluate technologies against a few specific contexts as case studies; and then identify the contingencies where the findings from the DRM doesn’t apply
- How do we take one context and identify what the key levers/criteria are? How do we detect whether contextual differences really matter?
- What is the durability of the social environment? Who do you need to buy into the solution? Are there lead adopters – or do you need buy-in from local authorities in order to proceed? We need to understand the local power structure – strength of public sector vs. civil society orgs and also find a way to get feedback from the poor.
- On latrine case study question #4: for the pilot evaluation, we need to make sure that the larger context is the same as the pilot context or else it may not work; maybe use Agent Based Modeling for use and adoption; however, this is deterministic so need to capture stochastics as well
- Case study #6: the best way to convince people that something works is through the use of a demonstration
- Tool development
 - Identify contextual specifics that will allow this technology to work (e.g. regions, cultures, geographical, environmental, etc)
 - Build tool (too many reports for practitioners; develop scorecard – see Water for People tool <http://www.waterreportingplatform.org/>)
 - Even providing insight into similar tech projects around the world would be helpful
 - Can we find a way to data mine the Development Experience Clearinghouse (DEC)? Might be a good UROP project
 - Also, how do we capture “craft knowledge” – all of the knowledge that is in the minds of technical experts in practitioner orgs?
- How do we identify technologies?
 - First, what is a technology/ Need taxonomy or ontology or Object Process Methodology (OPM) functional decomposition
 - Should we look at different technologies that exist elsewhere but could be adopted for the development context
 - Very different approach than local entrepreneurship
 - Understanding project failures and partial successes (e.g. arsenic in water supply in Bangladesh – have water but not good quality)
 - When reviewing technology evaluations, keep in mind that they can be highly influenced by point of view of the group paying for the evaluation
- Role of context:
 - For Pirogue case study, the key contextual characteristics were: urban slum; West Africa; flood prone; involved government; land rights issues; access; economic base – so which of the contextual criteria are key to the performance?

- What are necessary but not sufficient conditions?
- Would there be a high score on report, but too many disclaimers or limits to context in which the score is valid
- Could be good role for models – identify 5-10 factors that make the biggest difference for each sector; then perform sensitivity analysis